The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review

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Abstract

The growing integration of artificial intelligence (AI) dialogue systems within educational and research settings highlights the importance of learning aids. Despite examination of the ethical concerns associated with these technologies, there is a noticeable gap in investigations on how these ethical issues of AI contribute to students' over-reliance on AI dialogue systems, and how such over-reliance affects students' cognitive abilities. Overreliance on AI occurs when users accept AI-generated recommendations without question, leading to errors in task performance in the context of decision-making. This typically arises when individuals struggle to assess the reliability of AI or how much trust to place in its suggestions. This systematic review investigates how students' over-reliance on AI dialogue systems, particularly those embedded with generative models for academic research and learning, affects their critical cognitive capabilities including decision-making, critical thinking, and analytical reasoning. By using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, our systematic review evaluated a body of literature addressing the contributing factors and effects of such over-reliance within educational and research contexts. The comprehensive literature review spanned 14 articles retrieved from four distinguished databases: ProQuest, IEEE Xplore, ScienceDirect, and Web of Science. Our findings indicate that over-reliance stemming from ethical issues of AI impacts cognitive abilities, as individuals increasingly favor fast and optimal solutions over slow ones constrained by practicality. This tendency explains why users prefer efficient cognitive shortcuts, or heuristics, even amidst the ethical issues presented by AI technologies.